

Activities of ARIB

Kohei SATOH

Managing Director, ARIB

E-mail: satoh@arib.or.jp

Outline of ARIB

■ Objectives

- To establish technical standards for radio systems as “ARIB Standards” in the field of telecommunication and broadcasting in Japan
- To conduct investigation and R&D for utilization of radio waves
- To conduct correspondence, coordination and cooperation with overseas organizations

■ Establishment

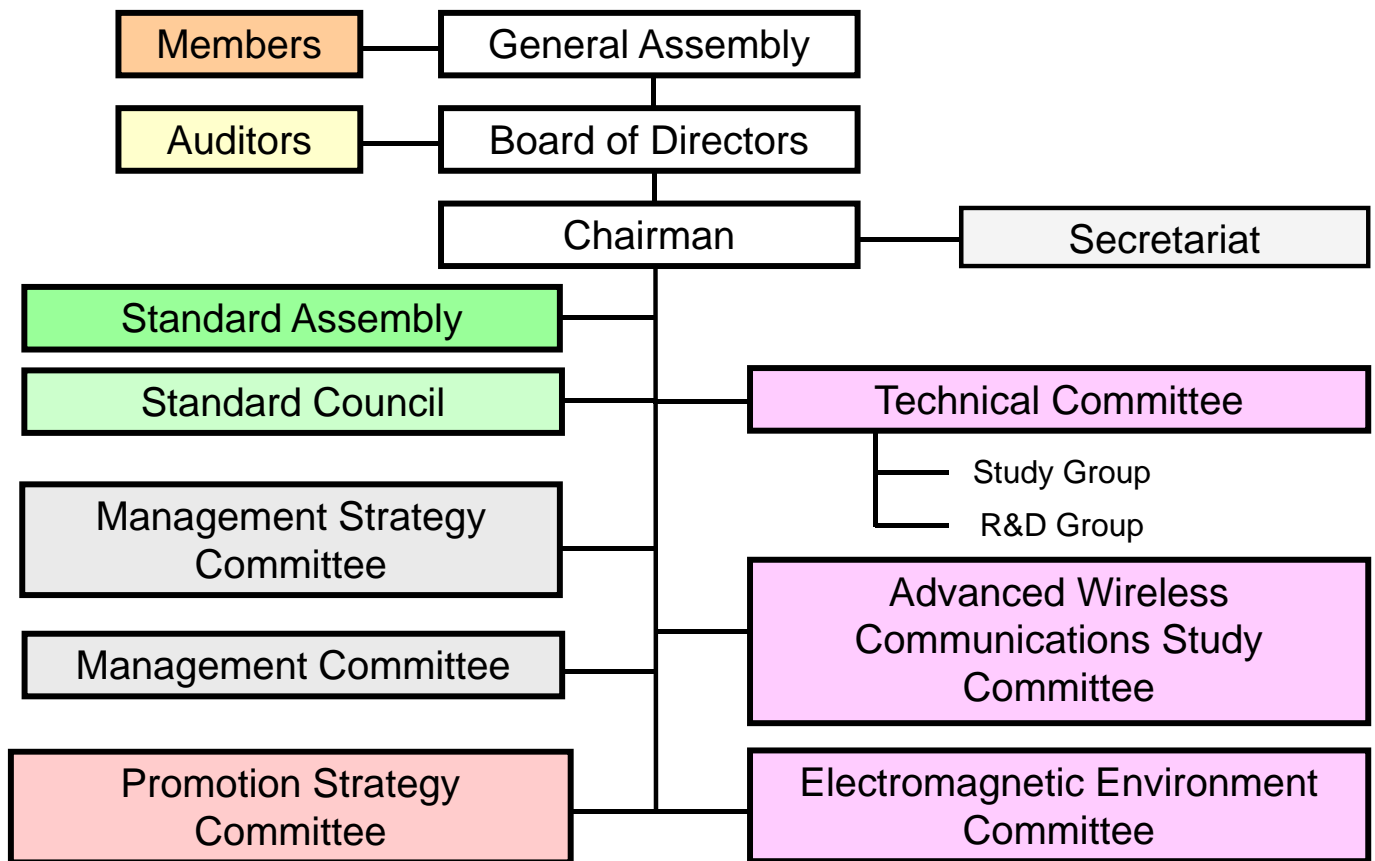
- 15th May 1995 as a public service corporation
- By merging two organizations, RCR and BTA, who had worked on standardization from 1985 to 1995.

RCR : Research & Development Center for Radio Systems

BTA : Broadcasting Technology Association

■ Members (as of 1st September 2013)

- Regular members : 213
 - Telecom Operators : 10
 - Broadcasters : 22
 - Manufactures : 150
 - Others : 31
- Supporting members: 4

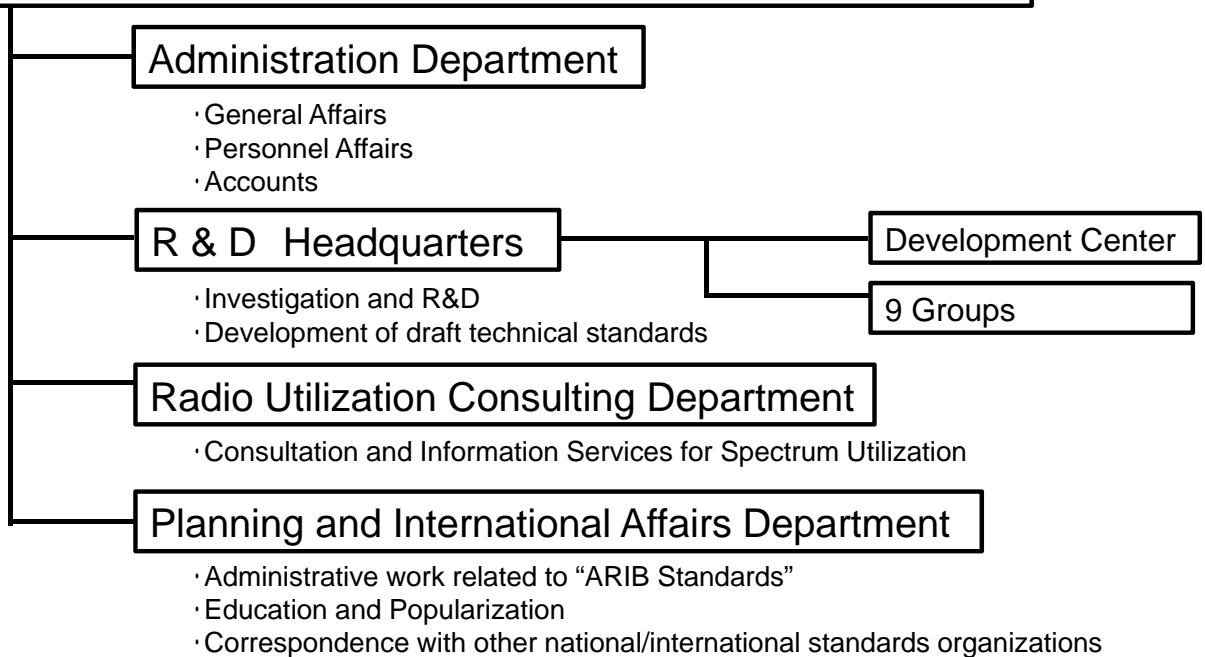


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Summary of Technical and Standardization Activities in ARIB

■ Standardization	Standard (STD) :	152
	Technical Report (TR):	64
■ Technical Committee	Study Group :	2
	R&D Group :	6
■ Advanced Wireless Communications Study Committee (ADWICS)	Subcommittee :	5
■ Promotion Strategy Committee	Subcommittee :	1
	ISDB-T : 14 countries	
■ Electromagnetic Environment Committee	Subcommittee :	2

Senior Managing Director/Secretary General*: Mr. Fusaki MATSUI
Managing Director: Dr. Kohei SATOH
Executive Director: Mr. Tadaaki YOKOO



*: New Senior Managing Director was appointed at the last General Assembly held on 19th June 2013.

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Classification of ARIB Standards

■ Telecommunications

- Radio facilities/equipment/devices for Telecom. Businesses (Mobile/Fixed, Land/Satellite, etc.)
- Radio facilities/equipment/devices for Other Businesses (trunked radio systems, radio systems for business, public safety, local government use, etc.)
- Low Power equipment/devices for data com., radio microphone, cordless telephone, WLAN/wireless access, RFID, ITS, UWB, etc.
- Others: SAR measurement for mobile phones, EMC, Power Line Communications, Optical Wireless LAN, etc.

■ Broadcasting

- Digital Broadcasting (Terrestrial/Satellite, Fixed/Mobile Reception, TV/Multimedia)
- Transmission for programme contribution/distribution
- Studio facilities/equipment
- Quality Evaluation Methods (Video/Audio, mobile reception, FPD, etc.)

■ Common or Others

- Measurement Methods

■ Advanced Wireless Communications

- International Mobile Telecommunication (IMT):
Continuing enhancement and study of new spectrum
 - IMT-2000
 - LTE, HSPA, DC-HSDPA, EV-DO Multi-Carrier etc.
 - IMT-Advanced
 - LTE-Advanced, WirelessMAN-Advanced
- Broadband Wireless Access (BWA):
Continuing enhancement and study of new spectrum
 - WiMAX
 - XGP, AXGP

■ Intelligent Transport Systems (ITS)

- Standardization of 700MHz Band Intelligent Transport Systems (ITS) Completed
- Standardization of 79GHz Band high-resolution radar completed (78-81GHz at the moment)

■ Broadband Mobile Communications System for public use

- Standard being enhanced and updated

■ Wireless LAN* System * LAN: Local Area Network

- Study on Technical Issues of Wireless LAN System with a view to improve the reliability and advance the system

■ Ultra High Definition TV (UHDTV)

- Standard of UHDTV System Parameters for Program Production Completed (March 2013)

■ White Space in Digital TV Band

- Standard of Transmission System for Area Broadcasting Completed (July 2012)

■ Mobile Multimedia Broadcasting System (MMBS)

- Nationwide Area service on VHF-High was launched on 1st April 2012

■ Study on new technologies for the next generation broadcasting system

- Future glassless 3D television
- Hybrid broadcast broadband Digital TV
- Transmission Technologies of Next Generation Digital Broadcasting

■ Digital Switchover in Japan

- Analog TV broadcasting were terminated at 12 noon, 24th July 2011, except 3 prefectures suffered by Eastern Japan Great Disaster on 11th March 2011
- In those 3 prefectures (Iwate, Miyagi and Fukushima), analog TV was terminated on 31st March 2012

■ New DTV Tower

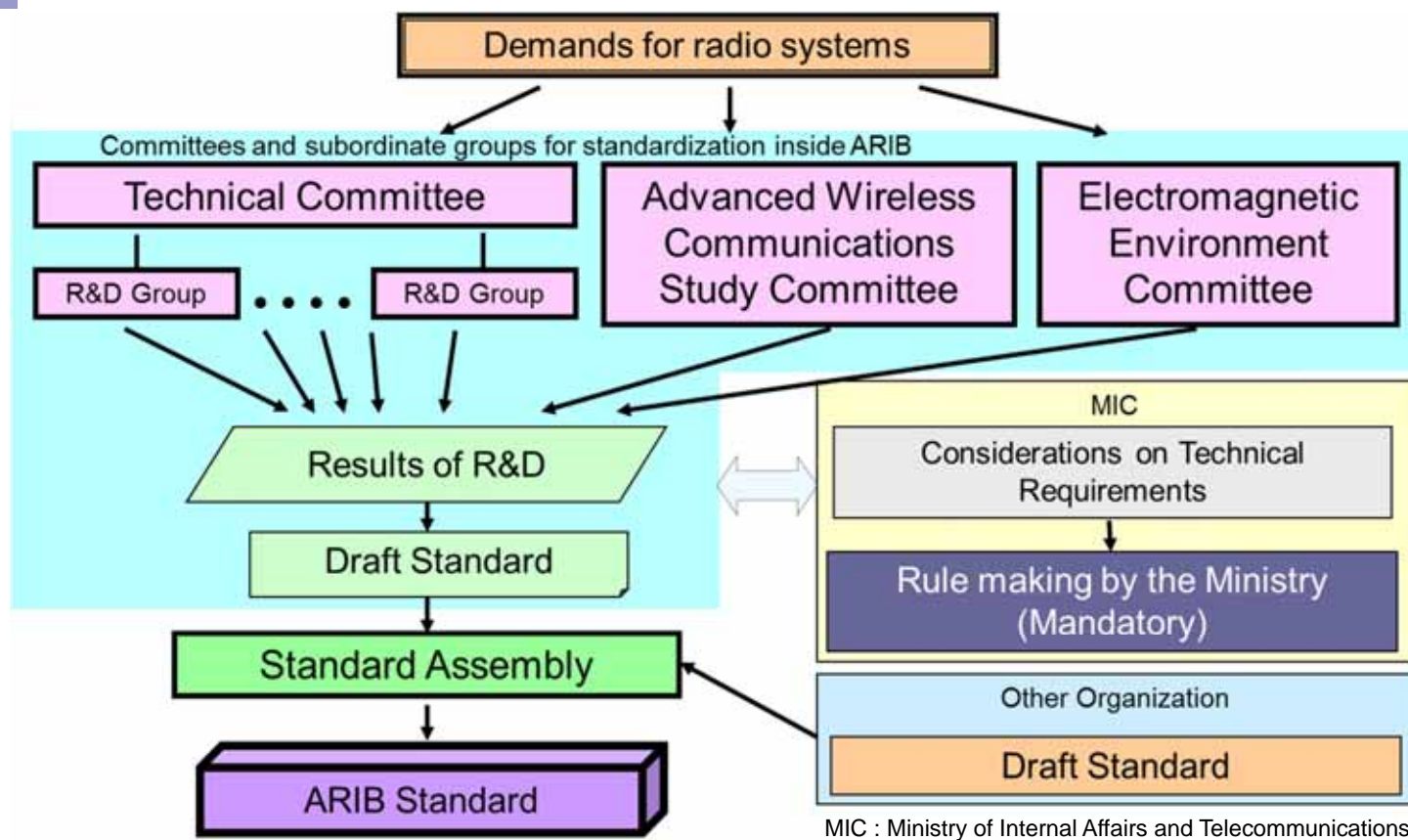
“ *Tokyo Sky Tree (634m)* ”

- Grand opening on 22nd May 2012
- Visitors : 6million (~ May 2013)
- DTV transmission from *Tokyo Sky Tree* was started in 31st May 2013

■ FoBTV (Future of Broadcast Television)

- ARIB became a Managing Committee member of FoBTV in August 2012





ARIB Standard Assembly

■ Establishment

- May 1995

■ Membership

- Open to any entity, organization and person
- Independent from ARIB membership
- Members : 176 (as of 1st August 2013)
 - Telecom Operators : 9
 - Broadcasters : 18
 - Manufactures : 129
 - Others : 18

■ Holding period

3 - 4 times a year

Outcome from Standard Assembly

■ ARIB Standard (STD)

- technical specification not covered by technical regulation

■ ARIB Technical Report (TR)

- technical information not included in Standard

■ Number of STD and TR * (As of 3rd July 2013)

	STD	TR
Telecommunications	92	23
Broadcasting	60	40
General	0	1

* Not including suppressed STD/TR

■ Free Download

<http://www.arib.or.jp/english/html/overview/index.html>

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Standardization Activities(2/2)

List of New ARIB Standards (Nov. 2011 – July 2013)

■ Telecommunications

- ✓ ARIB STD-T106 : 920MHz-Band RFID Equipment for Premises Radio Station
- ✓ ARIB STD-T107 : 920MHz-Band RFID Equipment for Specified Low Power Radio Station
- ✓ ARIB STD-T108 : 920MHz-Band Telemeter, Telecontrol and Data Transmission Radio Equipment
- ✓ ARIB STD-T109 : 700 MHz Band Intelligent Transport Systems
- ✓ ARIB STD-T110 : DSRC Basic Application Interface
- ✓ ARIB STD-T111 : 79 GHz Band High-Resolution Radar
- ✓ ARIB STD-T112 : Specified Radio Microphone for Land Mobile Radio Station (TV White Space BAND, 1.2GHz BAND)

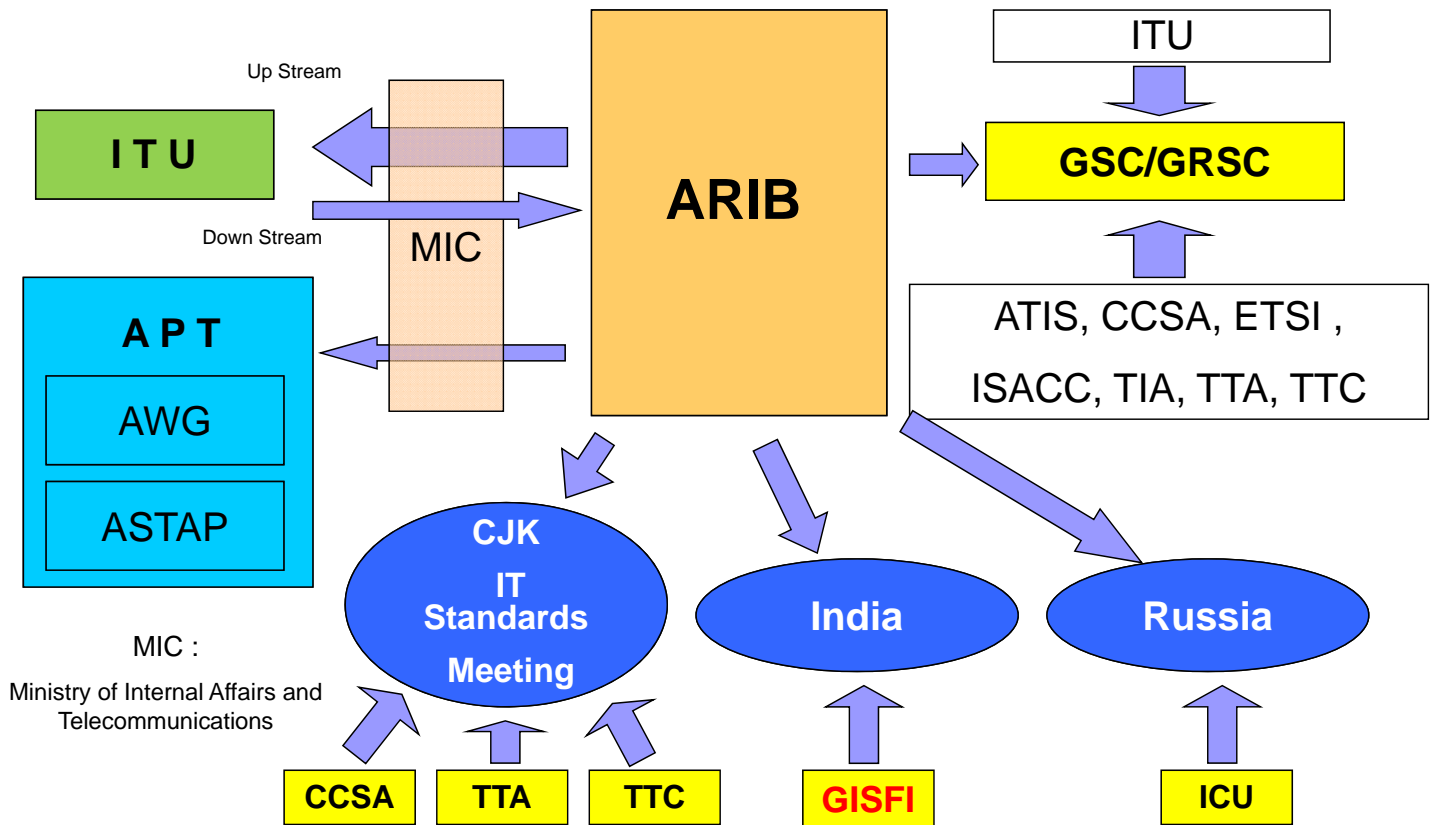
■ Broadcasting

- ✓ ARIB STD-B55 : Transmission System for Area Broadcasting
- ✓ ARIB STD-B56 : UHDTV System Parameters for Program Production

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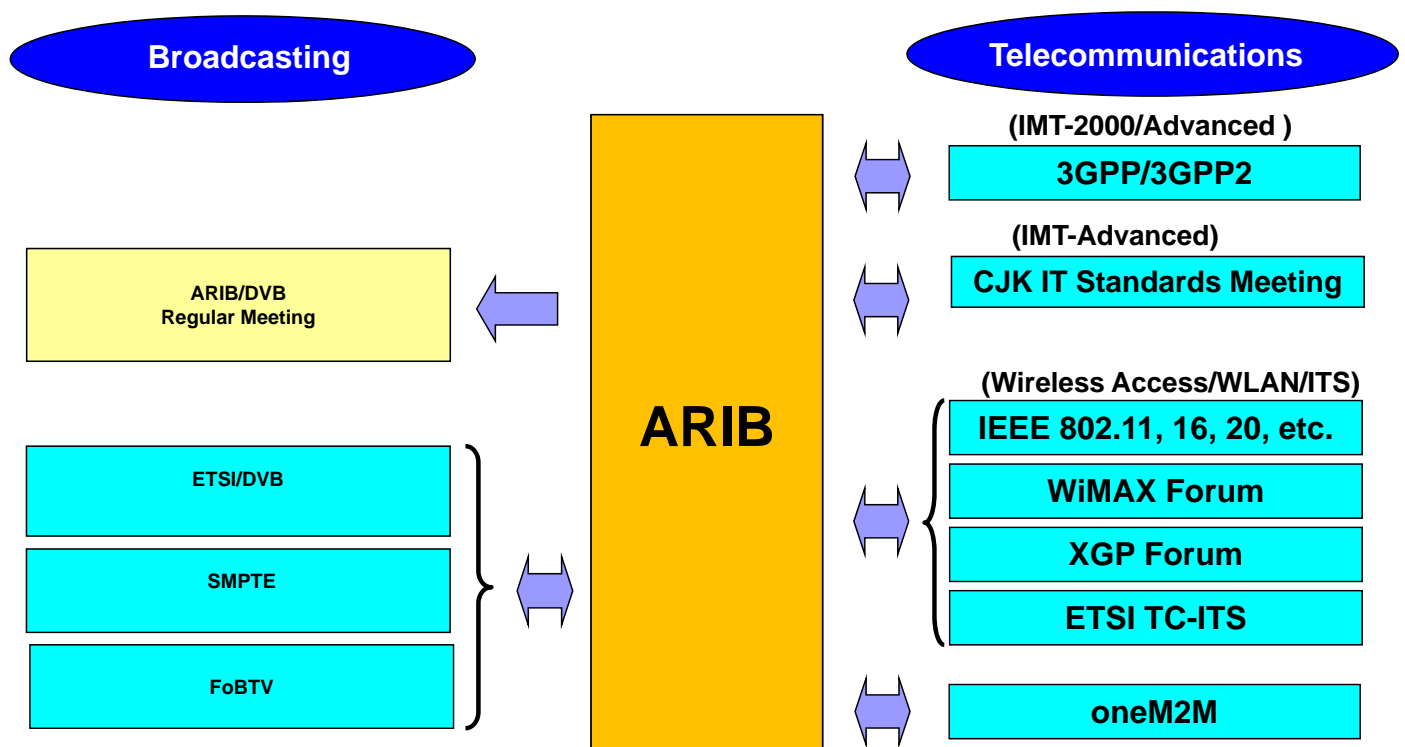
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Standards Collaboration (General)



Relation with other Organizations

(Specific Projects)



- Closer collaboration among SDOs towards Global Standards
- Active exchange of information and views with other SDOs at meetings such as CJK, ITU-R WPs, APT Wireless Group and GSC.

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Association of Radio Industries and Businesses



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Supplementary Slides

Recent Activities on Mobile Communications

■ Trend of mobile phone

- Total number of subscribers : **134.4 Million** (as of August 2013)
 - LTE NTT DOCOMO : **15.84 Million** (as of August 2013)
 - eAccess, KDDI and SOFTBANK MOBILE : No LTE subscriber numbers were published

■ Trend of BWA

- Mobile WiMAX service (UQ communications Inc.)
 - Number of subscribers: **4.264 Million** (as of August 2013)
- Advanced XGP service (Wireless City Planning Inc.)
 - Number of subscribers: **1.906 Million** (as of August 2013)

■ Activities on IMT (IMT-2000 and IMT-Advanced)

- KDDI started commercial service based on enhanced CDMA 2000 high speed data mobile communication system(EVDO Multi-Carrier(up to 3carriers) /800MHz&2GHz band) in Nov. 2010.
- EMOBILE(eAccess) started enhanced 3.5G commercial service(DC-HSDPA /1.7GHz band) in Dec. 2010.
- NTT DOCOMO started 3.9G commercial service(LTE/2GHz band) in Dec. 2010.
- SOFTBANK MOBILE started enhanced 3.5G commercial service(DC-HSDPA/1.5GHz band) in Feb. 2011.
- eAccess started 3.9G commercial service(LTE/1.8GHz band) in Mar. 2012.
- KDDI introduced EV-DO Advanced technology in Apr. 2012 and deployed nationwide in the end of Jun. 2012. (*In this technology, the load of each base station is monitored in real time and so adjusted that an user throughput will be improved.*)
- SOFTBANK MOBILE started 3.5G commercial service in 900MHz band from 25 Jul. 2012.
- KDDI and SOFTBANK MOBILE started LTE commercial service on 21 Sep. 2012.

■ Activities on 2.5GHz Band BWA systems

- UQ Communications started mobile WiMAX(IEEE802.16e) commercial service in Jul. 2009.
- WILLCOM started XGP(eXtended Global Platform) commercial service in Oct. 2009.
- Wireless City Planning (WCP) took over WILLCOM's XGP service in Dec. 2010.
- WCP started AXGP(advanced XGP) monitor service in Nov. 2011. XGP service was terminated in 31 Jan. 2012.
- SOFTBANK MOBILE as MVNO started AXGP commercial service in 24 Feb. 2012.
- UQ Communications announced in Oct. 2012 that they had started investigation to deploy WiMAX Release 2.1 as the next enhancement.

■ Activities for diffusion of 3.9G mobile communication systems

- Start to study on technical requirements for mobile communication systems using 700/900MHz bands by **Information and Communications Council (ICC)** in Dec. 2009.
- Partial report from **ICC** in May 2011 with the conclusion that LTE FDD, W-CDMA/HSPA, HSPA Evolution and DC-HSDPA are technically applicable in **900 MHz band**.
- Consultation with **Radio Regulatory Council (RRC)** and report from **RRC** on draft guidelines for establishment of base stations for diffusion of 3.9G mobile communications systems using **900MHz band**, and etc. in Dec. 2011.
- Start to accept applications for authorization of establishment plans for special base stations for diffusion of 3.9G mobile communications systems using **900MHz band**, etc. by MIC in Dec. 2011 with application deadline of 27th Jan. 2012.
- Appeal for public opinions on technical requirements for mobile communication systems utilizing **700MHz band** in Dec. 2011 with deadline of 26th Jan. 2012.
- It was announced on Jan. 30th 2012 that four applications (**eAccess, KDDI, NTT DOCOMO** and **SOFTBANK MOBILE**) for authorization of establishment plans for base stations for diffusion of 3.9G mobile communications systems using **900MHz band**, etc. were received.
 - On 29 Feb. 2012, RRC reported to approve the plan of SOFTBANK MOBILE.
- Partial report from **ICC** in Feb. 2012 with the conclusion that LTE FDD, W-CDMA/HSPA, HSPA Evolution and DC-HSDPA are technically applicable in **700MHz band**.

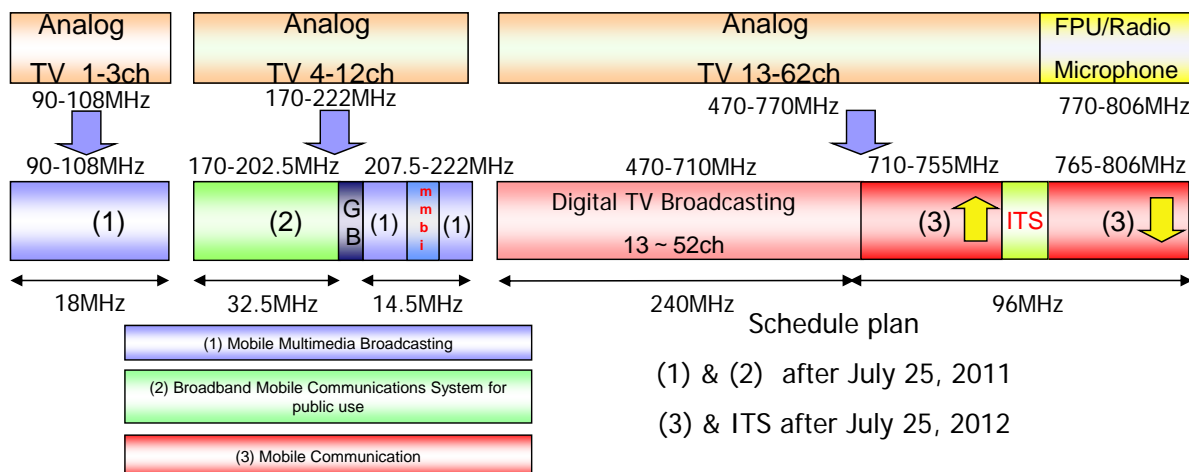
■ Activities for diffusion of 3.9G mobile communication systems (cont.)

- Appeal for public opinions on draft guideline for establishment of special base stations for diffusion of 3.9G mobile communications systems using 700MHz band by MIC in 29 February 2012.
- Consultation with RRC and report from RRC on draft guidelines for establishment of base stations for diffusion of 3.9G mobile communications systems using 700MHz band, and etc. on 11 Apr. 2011.
- Start to accept applications for authorization of establishment plans for base stations for diffusion of 3.9G mobile communications systems using 700MHz band, etc. by MIC on 17 Apr. 2012.
 - On 27 June 2012, RRC reported to approve the plans of eAccess, NTT DOCOMO and KDDI.

■ Activities for diffusion of 4G mobile communication systems

- Start to study on “technical requirements for the 4th generation mobile communication systems (IMT-Advanced)” by ICC in Apr. 2012, toward introduction of IMT-Advanced system in Japan. The band 3.4-3.6GHz and candidate band for IMT-Advanced in Japan are to be studied.
 - ◆ Plan of interference study in ICC
 - In 3.4 -3.6 GHz, carry out desk calculation of interference between IMT-Advanced and other existing systems or between IMT-Advanced systems, based on the standard value.
 - In 3.6 - 4.2 GHz, apply the study results in 3.4 - 3.6 GHz band and carry out additional interference study if necessary.
 - In the frequency range of the existing mobile service, investigate whether interference between IMT-Advanced and other existing systems is within the scope of the past ICC report.
- ICC will report of study result in June 2013.

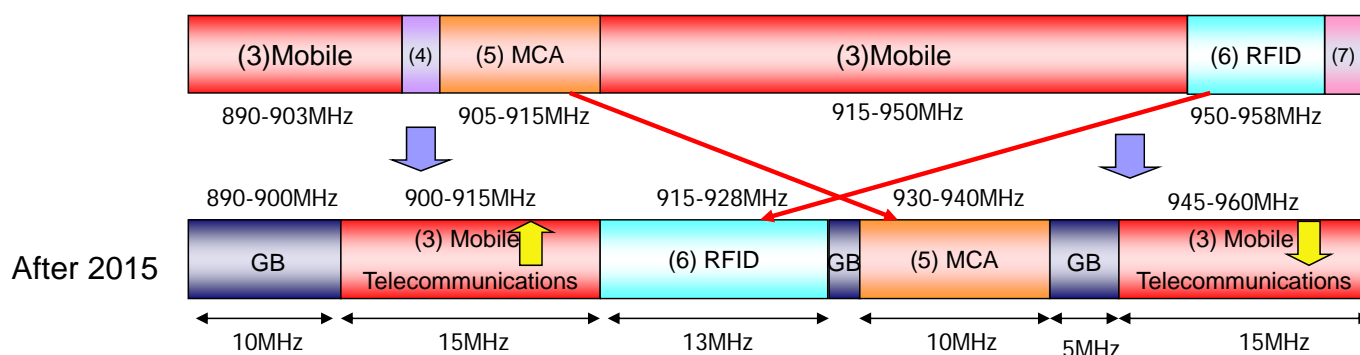
VHF·UHF ~ 806MHz



- "mmbi" started Multimedia Broadcasting Service on April 1, 2012
- 700MHz Issue

- FPU/Radio Microphone : Reallocation to another band
(1.2GHz, 2.3GHz and DTV white space)

890MHz ~ 960MHz



(3) Assigned to SOFTBANK MOBILE in March 2012

(4) Personal Radio : Terminated by 2015

(7) STL/TTL : Reallocation to another band

- Shift of existing systems

Cost for MCA/ RFID to be born by Mobile Operator

■ Feb. 2012

- Partial report from **ICC** on technical requirements for mobile communication systems using **700MHz band** was issued.
- Possible band plan in 700MHz is shown below taking into account global spectrum harmonization and minimum bandwidth of required guard bands.

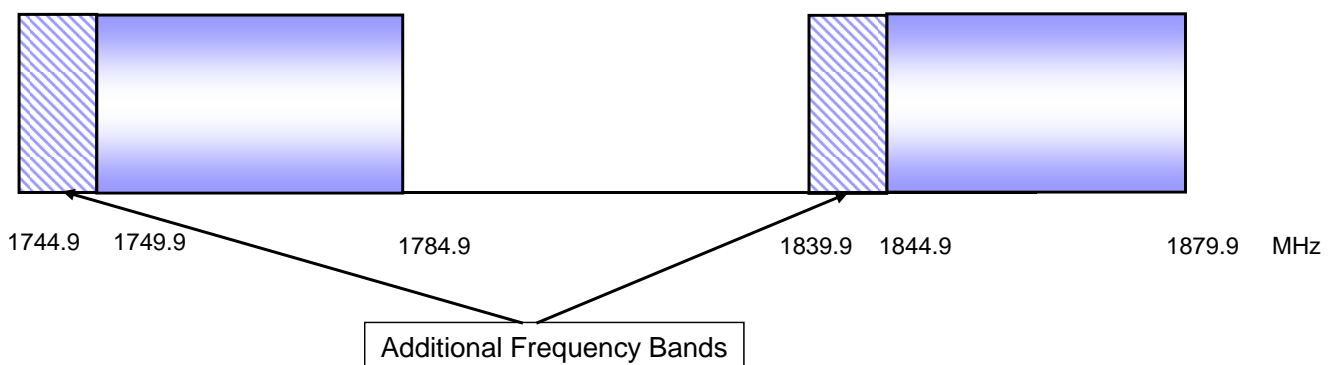


■ Jun. 2012

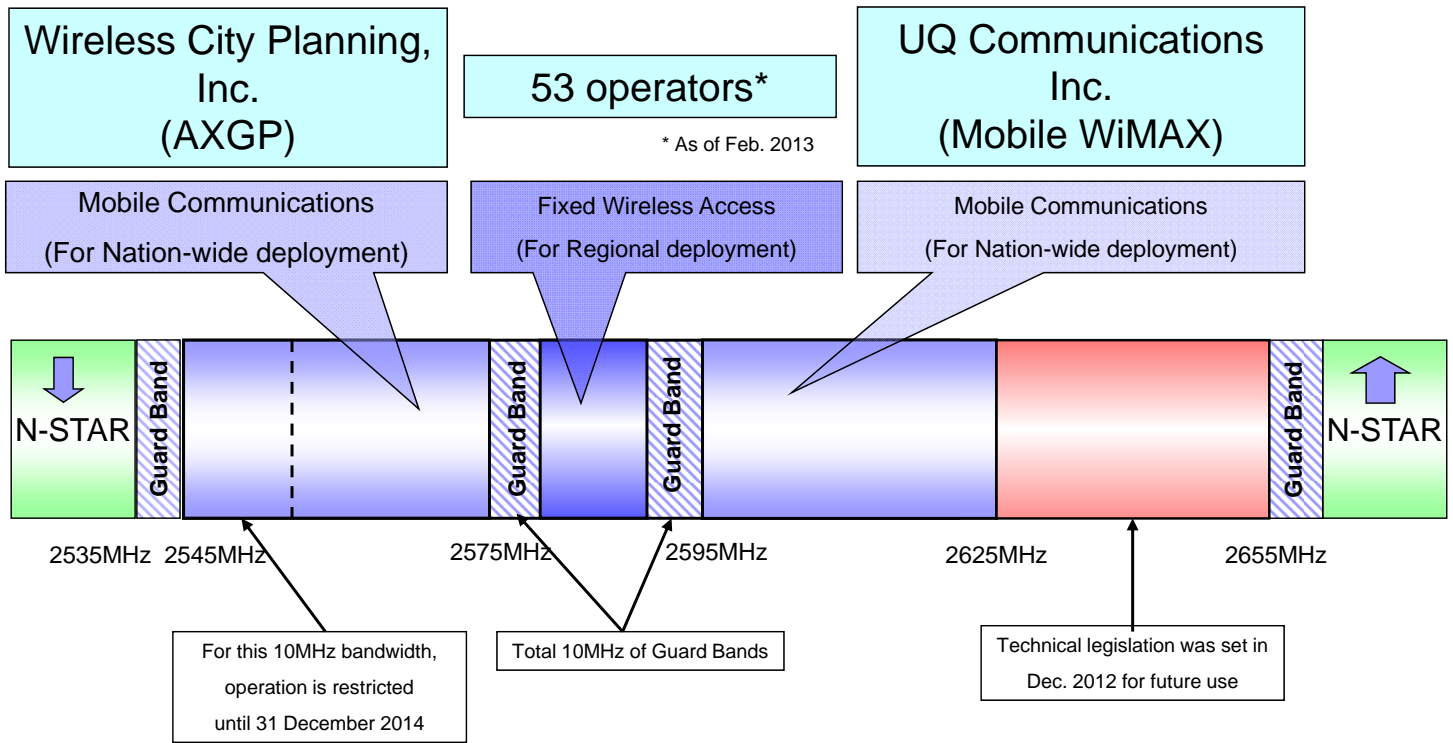
- RCC approved the deployment plans of eAccess, NTT DOCOMO and KDDI, and the following frequencies were assigned.
 - KDDI: 718-728/773-783MHz
 - NTT DOCOMO: 728-738/783-793MHz
 - eAccess: 738-748/793-803MHz

1.7GHz IMT Band Expansion

- 35MHz × 2 (UL: 1749.9-1784.9MHz, DL: 1844.9-1879.9MHz) in 1.7GHz band was allocated to IMT since 2005.
- The technical legislation of the adjacent 5MHz × 2 band (UL: 1744.9-1749.9MHz, DL: 1839.9-1844.9MHz) was set in December 2012 for future use by IMT



2.5 GHz-band Channel Plan for BWA



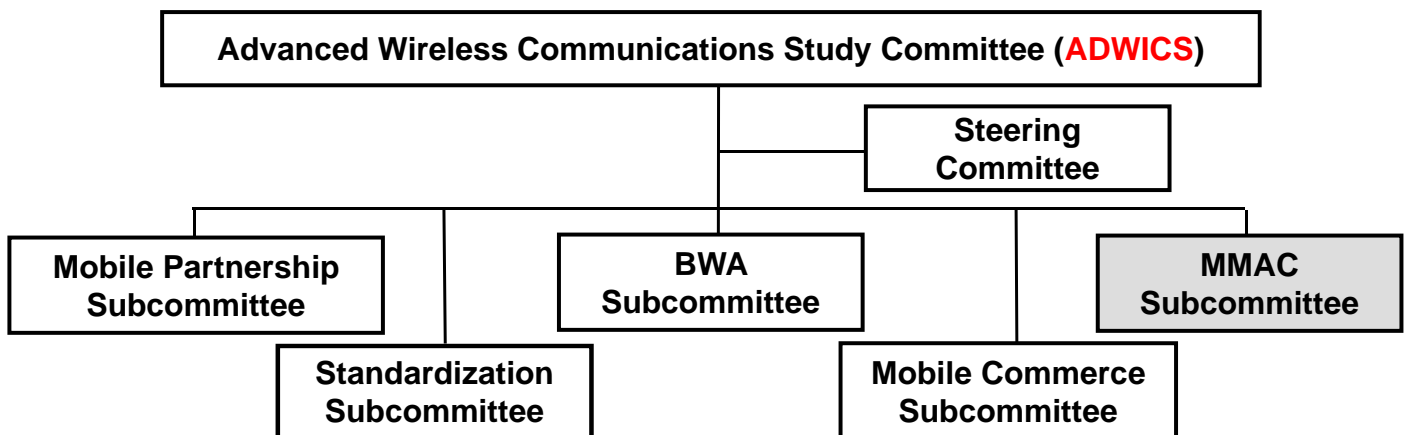
Advanced Wireless Communications Study Committee

■ Responsibilities

- To conduct technical studies on advanced wireless communication systems in cooperation with other related international/domestic organizations
- To contribute to the global standardization

■ Structure of the Study Committee (as of Apr. 2012)

- The MMAC subcommittee was established to study multimedia mobile access communications in April 2012.

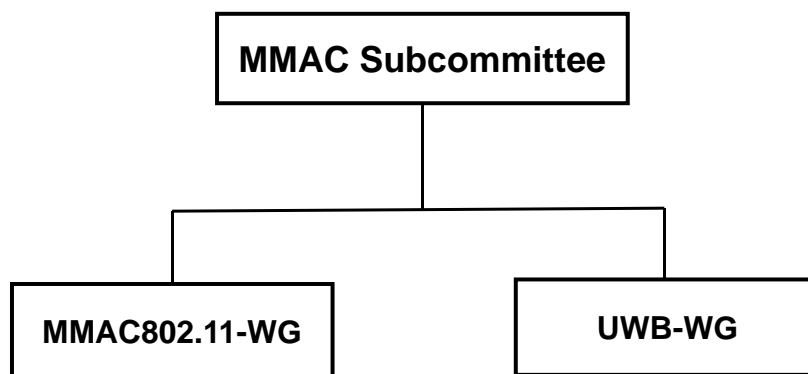


■ MMAC802.11-WG

- Liaison with IEEE802.11 WG
- Maintaining ARIB standard (ARIB STD-T71) and drafting revision
- Study on the high throughput WLANs (over 1GBps) that are under development in IEEE802.11

■ UWB-WG

- Investigation of interference mitigation for UWB (Ultra Wide Band) system
- Experimental test of the propagation of UWB system
- Maintaining ARIB standard (ARIB STD-T72 & T91) and drafting revision
- Exchange information regarding the interference mitigation function with other countries



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M2M Activities in ARIB

- Established “M2M Study AdHoc Group” in ADWICS on 22 Jun. 2011 to study M2M standardization and promote and coordinate international framework on M2M standardization.
- ARIB and TTC have been jointly discussing about issues related to M2M standardization since Jul. 2011.
- ARIB and TTC have been participating in meetings of Potential Partners for Machine to Machine (M2M) Consolidation.
- ARIB/TTC M2M joint workshop was held on 1 Dec. 2011.
- ARIB/TTC hosted and sponsored 4th M2M consolidation SDOs meeting in Japan on 28-29 Mar. 2012.
- It was approved in ADWICS to establish “oneM2M Support WG” under Mobile Partnership Subcommittee in synchronization with launch of oneM2M and close the “M2M Study AdHoc Group” on 18 May, 2012.
- The “oneM2M Support WG” jointly studies oneM2M related issues with TTC oneM2M Working Group.

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- **ARIB updates standards on IMT-2000 DS-CDMA and MC-CDMA based on 3GPPs specifications every 3-4 months.**
 - Current Version
 - ✓ STD-T63/TR-T12 : IMT-2000 DS-CDMA and TDD-CDMA System Ver.9.60
 - ✓ STD-T64/TR-T13 : IMT-2000 MC-CDMA System Ver.6.20
- **ARIB updates standards on IMT-Advanced in synchronization with 3GPP and IEEE specifications.**
 - Current Version
 - ✓ ARIB STD-T104 : LTE-Advanced System Ver.1.50
 - ✓ ARIB STD-T105 : WirelessMAN-Advanced System Ver.1.10

- Contribution to the work in ITU-R Working Party 5D related to WRC-15 agenda items 1.1 & 1.2, Future IMT, revision of M.1457 & M.2012 and others
- Conduct communication & collaboration with external related bodies
(main activities are CJK IMT collaboration)

■ ARIB updates standards on;

“OFDMA Broadband Mobile Wireless Access System”

(WiMAX™ applied in Japan)

“OFDMA/TDMA TDD Broadband Wireless Access System”

(Next Generation PHS)

“Mobile Broadband Wireless Access System”

(IEEE 802.20 TDD Wideband and 625k-MC Modes Application in Japan)

□ Current Version

✓ STD-T94 OFDMA Broadband Mobile Wireless Access System Ver. 2.4

✓ STD-T95 OFDMA/TDMA TDD Broadband Wireless Access System Ver. 2.2

✓ STD-T97 Mobile Broadband Wireless Access System Ver. 2.0

- Moved from mITF (mobile IT Forum) on April 2009
- Promote the development and standardization of mobile commerce
- Contribute to the advancement and growth of mobile content service business market
- Study of encryption algorithm for mobile PKI (Public Key Infrastructure)
- Study of access method to E-Government from Mobile Terminal

(*MMAC : Multimedia Mobile Access Communications systems)

- Study on the high throughput Wireless LAN systems that are under development in IEEE802.11
- Study on the experimental test of the propagation of UWB (Ultra Wide Band) system considering real environments
- Study on WASN (Wide Area Sensor Network) systems using many simple radio data terminals distributed over a wide area

(Study Group for WASN was terminated successfully as of the end of March 2013.)

Recent Activities of ITS

■ R&D for Safe Driving Support

□ Communication

- Vehicle-to-Vehicle & Road-to-Vehicle Communication in UHF
- MIC selected 760MHz for ITS and requested Public Comments (21st Oct. 2011)
- Standard of 760MHz ITS System has just completed. (ARIB STD-T109)

□ Broadcasting

- VICS : Vehicle Information and Communication System in 79-90MHz (FM Multiplex Broadcasting)
- Radio Beacon : Public Road Traffic Information Service in 2.5GHz

□ Sensor - Millimeter-wave Radar System in 60/76/79GHz

- Standard for 79GHz band (78-81GHz) Radar has just completed. (ARIB STD-T111)
- WRC-15 Agenda Item 1.18: Automotive Radar at 79GHz band to cover 77-81GHz band for high-resolution radar.

- Completion of ARIB Standard for Broadband Mobile Communications System for Public Use
 - 200 MHz-Band Broadband Wireless Communication Systems between Portable BS and MSs (ARIB STD-T103)

- Continuing enhancement



Recent Activities on Broadcasting

Standard completed

■ Mobile Multimedia Broadcasting System

- ISDB-Tmm (ARIB STD-B45,46,53), Media-FLO (ARIB STD-B47 ~ 52) for Nationwide area (VHF-H)
- ISDB-T_{SB} (ARIB STD-B29) for Local Block area (VHF-L)
- Transmission System for Area Broadcasting (ARIB STD-B55)

■ Program Production System

- Loudness of Digital Television System (ARIB TR-B30)
- File-Based Program Exchange (ARIB TR-B31)
- UHDTV System Parameters for Program Production System (ARIB STD-B56)

Standard in progress

■ Ultra High Definition TV (UHDTV) System

- Video/Multichannel Sound System
- Interface between Equipment

■ Video Coding System

- High Efficiency Video Coding (HEVC) file format for broadcasting

■ 3DTV Broadcasting System

- Candidates: Simulcast system and Sharedcast system

■ Broadcast Material File Format

- Security Guidelines for Program Files
- Online Conversion System for Program Distribution Package

■ Digital Caption Markup Production

- General Caption Markup Language (GCML)